

# APPLICATION FOR A PERMIT TO CONSTRUCT MODIFICATION

**QB Corporation**  
**Salmon, Idaho**

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Department of Environmental Quality  
State Air Program

ORIGINAL

Prepared For: Rockie Walker  
Maintenance Supervisor / Purchasing  
QB Corporation  
1420 Highway 28  
Salmon, Idaho 83467-9712  
Phone: (208) 756-2612  
Fax: (208) 756-4920  
e-mail: qbcorp.com

Prepared By: Spidell and Associates  
2403 Spaulding  
Boise, Idaho 83705  
Phone (208) 336-4862

# FEE RECEIVED FROM FACILITY

<p>Date Stamp (date received in PO)</p> <p style="text-align: right;">RECEIVED</p> <p style="text-align: right;">DEC 12 2007</p> <p style="text-align: right;">Department of Environmental Quality State Air Program</p>	
Facility Name	QB CORPORATION
Facility Location	SALMON
Fee Type (PTC Application, PTC Processing, T2 Processing)	PTC APPLICATION
Check Number	# 007209
Check Date	12/07/07
Check Amount	\$ 1000.00

QB CORPORATION

007209

DATE	DESCRIPTION	ACCT#	INV AMT	DISCOUNT	NET AMOUNT
12/06	PERMIT APPLICATION	716.00	1,000.00		1,000.00

TOTAL: 1,000.00

1,000.00

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**QB Corporation  
Salmon, Idaho**

**1. Purpose**

This application is being submitted by QB Corporation to modify their Permit to Construct number 059-00008 and to demonstrate compliance with National Ambient Air Quality Standards (NAAQS) for criteria pollutants and Acceptable Ambient Concentrations (AAC/AACC) for toxic air pollutants in IDAPA 58.01.01.585 and 586. The permit is being modified to include emissions from the cyclones, target box and lumber drying kiln. Idaho State Permit to Construct Application Forms are included in Appendix A

Company Name:

QB Corporation  
1420 Highway 28  
Salmon, Idaho 83467-9712  
Phone: (208) 756-2612  
Fax: (208) 756-4920  
e-mail: qbcorp.com

**2. Facility Description**

QB Corporation produces laminated beams, trusses and arches from dimensional lumber. The facility is located approximately 15 miles southwest of Salmon, Idaho on Highway 28. A location map and a scaled site plan of the facility are included as Figures 1 and 2.

**3. Facility Classification**

The facility is not a major facility as defined in IDAPA 58.01.01.006.55

The facility is not a designated facility as defined in IDAPA 58.01.01.006.27

**4. Emission and Source Data**

The facility employs a wood fired boiler and a 30,000 bpd capacity lumber drying kiln. Wood waste generated from the operations is transferred pneumatically through ten cyclones and a target box. Two of the cyclones are pull-through cyclones and do not exhaust to atmosphere.



#### 4.1 Wood Fired Boiler Emissions

##### Wood Fired Boiler specifications

Manufacturer	Industrial Boiler Co.
Model	3-1800-150 HRT Design
Output	8,910 pph steam at 135 psig and 212°F feedwater
Control	12-tube Zurn Multi-tube Collector

The boiler is used primarily to provide space heat for the facility. About ten percent of the steam heat from the boiler is used in the kiln to finish drying lumber too moist for processing.

The boiler input of 12.3 MMBtu/hr was calculated from source test results averaging 7,205.7 lb steam/hr and 2777.9 dscf/min at 12.8% O<sub>2</sub>. Using the F<sub>d</sub> factor of 9,240 dscf/MMBtu and a 70% boiler efficiency the input would be:

$$\frac{(2,777.9 \text{ dscf / min})(60 \text{ min / hr})(20.9 - 12.8)(8,910 \text{ lb steam / hr})}{(20.9)(9,240 \text{ dscf / MMBtu})(7,205.7 \text{ lb steam / hr})(70\% \text{ eff.})} = 12.3492 \text{ MMBtu / hr}$$

This falls within the 1,200 – 1,700 Btu/lb steam conversion factor in AP-42 Appendix A.

PM emissions were calculated using the grain loading emission limit in IDAPA 58.01.01.676 of 0.08 gr/dscf at 8% oxygen and the F<sub>d</sub> factor of 9,240 MMBtu/dscf. The PM emission limit was not adjusted for altitude as described in the modeling protocol. Adjusting the emission rate for altitude is not correct although the Idaho DEQ source test review staff has required this adjustment citing IDAPA 58.01.01.680.

$$\text{Exhaust Flow at 8\% O}_2 = \frac{\left(12.3 \frac{\text{MMBtu}}{\text{hr}}\right) \left(9,240 \frac{\text{dscf}}{\text{MMBtu}}\right) (20.9\% \text{ O}_2)}{(20.9\% \text{ O}_2 - 8\% \text{ O}_2)} = 184,133.86 \text{ dscf / hr}$$

$$\text{PM / PM}_{10} \text{ Emission Rate} = \frac{\left(184,133.86 \frac{\text{dscf}}{\text{hr}}\right) \left(0.08 \frac{\text{grains}}{\text{dscf}}\right)}{\left(7,000 \frac{\text{grains}}{\text{lb}}\right)} = 2.1044 \text{ lb / hr}$$

Using the AP-42 emission factor for PM-10 of 0.287 lb/MMBtu gives an emission rate of 3.53 lb/hr. Because this exceeds the allowable PM emission rate, the PM emission limit 2.104 lb/hr is also the PM-10 emission limit. Modeling the higher PM-10 emission rate generated by the AP-42 emission factor would be pointless as the grain loading limit would easily be exceeded at this rate.

All other emission estimates for the wood fired boiler were calculated using emission factors from AP-42 Section 1.6, Wood Residue Combustion In Boilers. To meet ambient air quality standards for toxic air pollutants, the boiler will be limited to 55,745 MMBtu/yr (40.3815 MM lb steam/yr). The boiler operating parameters and criteria air pollutant emission rates are summarized in the table below. An example calculation for CO is also included.

Boiler Operating Parameters	
Potential Input (MMBtu/hr)	12.3
Potential Annual Input (MMBtu/hr)	107,748.00
Limited Annual Input (MMBtu/yr)	55,745.45
Exhaust Flow (dcf/min)	3,068.90
Maximum Operating Hours per Year	8,760

Criteria Pollutants	Emission Factors lb/MMBtu	Potential Emission Rate		Limited Emission Rate	
		(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
PM/PM10	.08 dscf/m	2.1044	9.217	2.1044	4.769
SO <sub>2</sub>	0.025	0.308	1.347	0.308	0.697
NO <sub>x</sub>	0.22	2.706	11.852	2.706	6.132
CO	0.6	7.380	32.324	7.380	16.724
VOC	0.017	0.209	0.916	0.209	0.474
Lead	4.80E-05	5.90E-04	2.59E-03	5.90E-04	1.34E-03

$$\text{CO Emission Rate} = (0.6 \text{ lb/MMBtu})(12.3 \text{ MMBtu/hr}) = 7.38 \text{ lb/hr}$$

Toxic air pollutant emission rates from the boiler exceeding the emission screening levels in IDAPA 58.01.01.585 and 586 are shown in the table below.

Toxic Air Pollutants	Emission Factors lb/MMBtu	Potential Emission Rate		Limited Emission Rate	
		(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
Non-Carcinogenic					
Acrolein	4.00E-03	4.92E-02	2.15E-01	0.049	0.111
Hydrogen Chloride	1.90E-02	2.34E-01	1.02E+00	0.234	0.530
Silver	1.70E-03	2.09E-02	9.16E-02	0.021	0.047
Carcinogenic					
Acetaldehyde	8.30E-04	1.02E-02	4.47E-02	5.28E-03	2.31E-02
Arsenic (controlled)	1.18E-05	1.45E-04	6.36E-04	7.51E-05	3.29E-04
Benzene	4.20E-03	5.17E-02	2.26E-01	2.67E-02	1.17E-01
Benzo(a)pyrene	2.60E-06	3.20E-05	1.40E-04	1.65E-05	7.25E-05
Cadmium	4.10E-06	5.04E-05	2.21E-04	2.61E-05	1.14E-04
Carbon Tetrachloride	4.50E-05	5.54E-04	2.42E-03	2.86E-04	1.25E-03
Chloroform	2.80E-05	3.44E-04	1.51E-03	1.78E-04	7.80E-04
Chromium, Hexavalent	3.50E-06	4.31E-05	1.89E-04	2.23E-05	9.76E-05
1,2-Dichloroethane	2.90E-05	3.57E-04	1.56E-03	1.85E-04	8.08E-04
Formaldehyde	4.40E-03	5.412E-02	2.37E-01	2.80E-02	1.23E-01
Nickel	3.30E-05	4.06E-04	1.78E-03	2.10E-04	9.20E-04
Polyaromatic Hydrocarbons	2.94E-06	3.61E-05	1.58E-04	1.87E-05	8.18E-05

## 4.2 Cyclone and Target Box Emissions

Wood waste from the sanding, planing and trimming operations are pneumatically transferred through the cyclones and the target box to their respective bins. Emission rates for the cyclones and the target box were calculated using the process weight (PW) limit in IDAPA 58.01.01.701. Based on a potential total throughput of 750 lb of wood waste per hour, the PM emission limit =  $0.045(\text{PW})^{0.6} = 0.045(750)^{0.6} = 2.39 \text{ lb/hr}$ . To estimate emission for the individual cyclones and the target box, the total emissions were apportioned based on air flow and operating hours. PM-10 emissions were estimated from Section 10.5, Appendix B of AP-42 which shows a cumulative weight of 52.9% of the total PM for cyclone controlled wood waste collection operations. This fraction correlates with PM-10 emission factors from Attachment B of the "Idaho DEQ Emission Factor Guide for Wood Industry" which are 50% of the PM emission factors for medium efficiency cyclones. The table below summarizes emissions from the cyclones and target box.



Wood Waste Transfer Emissions							
Total Throughput (lb/hr)			750				
PM Emission Rate (lb/hr)			2.3892				
PM-10 Emission Rate (lb/hr)			1.2639				
Annual Operating Hours			4160				

Cyclone #	Exhaust Flow acfm	Operating hr/yr	Percent of Throughput	PM		PM10	
				(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
1	14320	4160	26.35%	0.6295	1.3093	0.3330	0.6926
2	15463	4160	28.45%	0.6797	1.4138	0.3596	0.7479
3	16875	4160	31.05%	0.7418	1.5429	0.3924	0.8162
4	5741	420	1.07%	0.0255	0.0530	0.0135	0.0280
5	5741	420	1.07%	0.0255	0.0530	0.0135	0.0280
6	5741	4160	10.56%	0.2524	0.5249	0.1335	0.2777
7	2812	20	0.02%	0.0006	0.0012	0.0003	0.0007
8	2223	20	0.02%	0.0005	0.0010	0.0002	0.0005
Target Box	1540	2080	1.42%	0.0338	0.0704	0.0179	0.0372
Total			100.00%	2.3892	4.9695	1.2639	2.6289

### 4.3 Lumber Drying Kiln Emissions

The lumber drying kiln has a capacity of 30,000 board feet and is used to finish drying lumber that is too moist for processing. Emission estimates were calculated using a limited annual throughput of 2 million board feet per year. Emission factors for the criteria air pollutants are from the "Idaho DEQ Emission Factor Guide for Wood Industry", Attachment B. Toxic air pollutants were estimated from emission factors developed by Oregon State University using the average for all wood species and a kiln temperature of less than 200° F.

Annual Throughput (Brdft)		2,000,000	
Average Hourly Throughput (Brdft)		228.31	

Criteria Pollutants	Emission Factors lb/MBrdft	Potential Emission Rate	
		(lb/hr)	(tons/yr)
PM	0.33	0.0753	0.330
PM-10	0.19	0.0434	0.190
VOC	1.5	0.3425	1.500

Toxic Pollutants Non-Carcinogenic	Emission Factors lb/MMBrdft	Potential Emission Rate	
		(lb/hr)	(tons/yr)
Acrolein	1.410	3.219E-04	1.410E-03
Methanol	70.400	1.607E-02	7.040E-02
Carcinogenic			
Propionaldehyde	0.910	2.078E-04	9.100E-04
Acetaldehyde	81.600	1.863E-02	8.160E-02
Formaldehyde	2.388	5.452E-04	2.388E-03

Emission factors and inventories for the sources are included in Appendix B.

### 5.0 Ambient Air Impact Assessment

The ambient air impact assessment was performed using five years of meteorological data from the Missoula, Montana meteorological station. The Idaho DEQ also required an analysis using meteorological data from Lewiston, Idaho, which they provided, and requested that the analysis for



PM-10 use the maximum 2<sup>nd</sup> highest 24-hour modeled concentration rather than the maximum 6<sup>th</sup> highest 24-hour PM-10 concentration for the NAAQS analysis. Both the maximum 2<sup>nd</sup> and 6<sup>th</sup> highest PM-10 concentrations are included in the NAAQS analysis. Pollutants emitted only by the boiler were modeled at an emission rate of 1 lb/hr for the various averaging periods. The resulting concentration at the 1 lb/hr emission rate was then multiplied by the boiler emission rate to get the total ambient impact for that pollutant at the appropriate averaging period. The tables below summarize the results of the significant impact analysis and the NAAQS analysis.

**Significant Impact Analysis for Criteria Air Pollutants**

Averaging Period	Meteorological Station	
	Missoula	Lewiston
Modeled 24-hr 1 <sup>st</sup> highest PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )	39.37111	96.84428
Modeled Annual PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )	9.33998	14.77702
Modeled 1-hr 1 <sup>st</sup> highest Concentration at 1 lb/hr ( $\mu\text{g}/\text{m}^3$ )	49.84418	57.35406
Modeled 3-hr 1 <sup>st</sup> highest Concentration at 1 lb/hr ( $\mu\text{g}/\text{m}^3$ )	34.11859	35.66431
Modeled 8-hr 1 <sup>st</sup> highest Concentration at 1 lb/hr ( $\mu\text{g}/\text{m}^3$ )	22.25975	27.2069
Modeled 24-hr 1 <sup>st</sup> highest Concentration at 1 lb/hr ( $\mu\text{g}/\text{m}^3$ )	14.60203	22.81944
Annual Concentration at 1 lb/hr ( $\mu\text{g}/\text{m}^3$ )	2.39638	1.74642

Pollutant	Averaging Period	Meteorological Station	Boiler Emission Rate (lb/hr)	Total Impact ( $\mu\text{g}/\text{m}^3$ )	Significant Contribution Limit ( $\mu\text{g}/\text{m}^3$ )	NAAQS Analysis Required?
PM-10	24-hour	Missoula 1987-1991	NA	39.37111	5	YES
	Annual			9.33998	1	YES
Sulfur Dioxide (SO <sub>2</sub> )	3-hour		0.3075	10.49146643	25	NO
	24-hour			4.490124225	5	NO
	Annual			0.73688685	1	NO
Nitrogen Dioxide (NO <sub>2</sub> )	Annual		2.706	6.48460428	1	YES
Carbon Monoxide (CO)	1-hour	Lewiston 1992	7.38	367.8500484	2000	NO
	8-hour			164.276955	500	NO
PM-10	24-hour		NA	96.84428	5	YES
	Annual			14.77702	1	YES
Sulfur Dioxide (SO <sub>2</sub> )	3-hour		0.3075	10.96677533	25	NO
	24-hour			7.0169778	5	YES
	Annual			0.53702415	1	NO
Nitrogen Dioxide (NO <sub>2</sub> )	Annual		2.706	4.72581252	1	YES
Carbon Monoxide (CO)	1-hour		7.38	423.2729628	2000	NO
	8-hour			200.786922	500	NO

**Full Impact NAAQS Analysis for Criteria Air Pollutants**

Averaging Period	Meteorological Station	
	Missoula	Lewiston
Modeled 1-hr Concentration at 1 lb/hr ( $\mu\text{g}/\text{m}^3$ )	49.84418	57.35406
Modeled 24-hr 2 <sup>nd</sup> highest Concentration at 1 lb/hr ( $\mu\text{g}/\text{m}^3$ )	11.51089	16.72882
Modeled 24-hr 2 <sup>nd</sup> highest PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )	38.3392	77.88816
Modeled 24-hr 6 <sup>th</sup> highest PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )	32.80528	54.41753
Modeled Annual PM-10 Concentration ( $\mu\text{g}/\text{m}^3$ )	9.33998	14.77702
Quarterly Concentration at 0.225 Persistence Factor ( $\mu\text{g}/\text{m}^3$ )	11.21494	12.90466
Modeled Annual Concentration at 1 lb/hr ( $\mu\text{g}/\text{m}^3$ )	2.39638	1.74642

Pollutant	Averaging Period	Rank	Meteorological Station	Boiler Emission Rate (lb/hr)	Total Impact ( $\mu\text{g}/\text{m}^3$ )	Background Concentration ( $\mu\text{g}/\text{m}^3$ )	Total Ambient Impact ( $\mu\text{g}/\text{m}^3$ )	Regulatory Limit ( $\mu\text{g}/\text{m}^3$ )	Percent of NAAQS
PM-10	24-hour	2 <sup>nd</sup>	Missoula 1987-1991		38.3392	73.0	111.3	150.0	74.23
		6 <sup>th</sup>			32.8053		105.8		70.54
	Annual	1 <sup>st</sup>			9.33998	26.0	35.3	50.0	70.68
Nitrogen Dioxide (NO <sub>2</sub> )	Annual	1 <sup>st</sup>		2.706	6.4846	4.3	10.8	100.0	10.78
Lead	Quarterly			5.904E-04	0.0066	0.0300	0.0366	1.5000	2.44
PM-10	24-hour	2 <sup>nd</sup>	Lewiston 1992		77.88816	73.0	150.9	150.0	100.59
		6 <sup>th</sup>			54.41753		127.4		84.95
	Annual	1 <sup>st</sup>			14.77702	26.0	40.8	50.0	81.55
Sulfur Dioxide (SO <sub>2</sub> )	24-hour	2 <sup>nd</sup>		0.3075	5.14411215	26.0	31.1	365.0	8.53
Nitrogen Dioxide (NO <sub>2</sub> )	Annual	1 <sup>st</sup>		2.706	4.7258	4.3	9.0	100.0	9.03
Lead	Quarterly			5.904E-04	0.0076	0.0300	0.0376	1.5000	2.51

Results of the NAAQS analysis shows that the 24-hr average for PM-10 is well below the standard using Missoula meteorological data for both the 2<sup>nd</sup> and 6<sup>th</sup> highest concentration. Using the Lewiston meteorological data shows the 2<sup>nd</sup> highest PM-10 24-hr average exceeds the standard by a small amount.

The ambient impact for toxic air pollutants exceeding the emission screening levels are summarized in the table below.

Averaging Period			Meteorological Station	
			Missoula	Lewiston
Modeled 24-hr Concentration at 1 lb/hr (µg/m³)			14.60203	22.81944
Modeled Annual Concentration at 1 lb/hr (µg/m³)			2.39638	1.74642

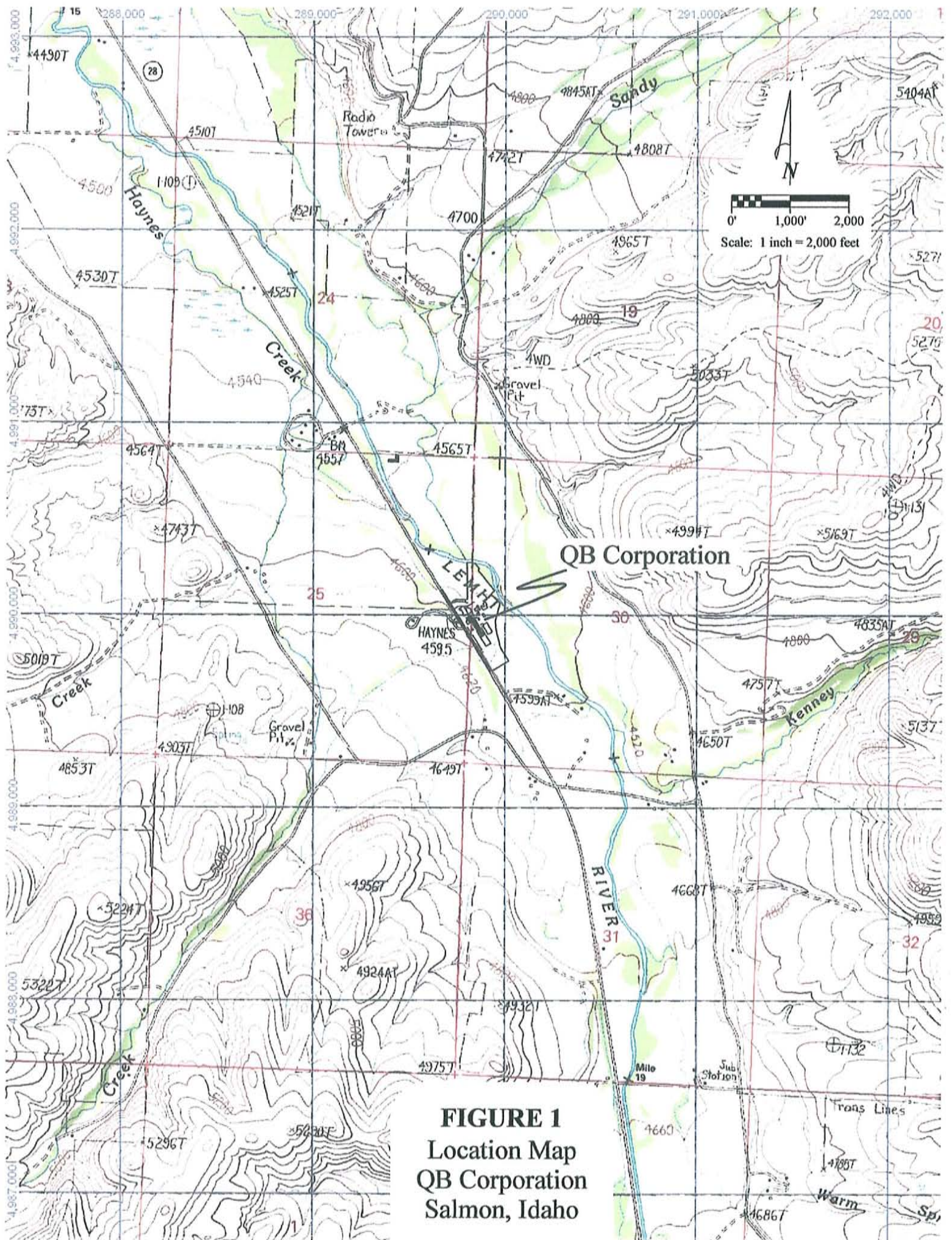
  

	Averaging Period	Meteorological Station	Boiler Emission Rate (lb/hr)	Concentration (µg/m³)	Limit (µg/m³)	Percent of Limit
Toxic Air Pollutants	24-hour	Missoula	NA	0.72405	12.5	5.79%
Acrolein*			2.337E-01	3.412	375	0.91%
Hydrogen Chloride			2.091E-02	3.05E-01	5	6.11%
Silver	NA		1.84E-01	4.50E-01	40.93%	
Acetaldehyde*	7.51E-05		1.80E-04	2.30E-04	78.24%	
Arsenic	2.67E-02		6.40E-02	1.20E-01	53.37%	
Benzene	1.65E-05		3.96E-05	3.00E-04	13.22%	
Benzo(a)pyrene	2.61E-05		6.25E-05	5.60E-04	11.16%	
Cadmium	2.86E-04		6.86E-04	6.70E-02	1.02%	
Carbon Tetrachloride	1.78E-04		4.27E-04	4.30E-02	0.99%	
Chloroform	2.23E-05		5.34E-05	8.30E-05	64.31%	
Chromium, Hexavalent	1.85E-04		4.42E-04	3.80E-02	1.16%	
1,2-Dichloroethane	NA		6.92E-02	7.70E-02	89.91%	
Formaldehyde*	2.10E-04		5.03E-04	4.20E-03	11.98%	
Nickel	1.87E-05		4.48E-05	3.00E-04	14.92%	
Polyaromatic Hydrocarbons	Annual	Lewiston	NA	1.1312	12.50	9.05%
Acrolein*			2.337E-01	5.333	375	1.42%
Hydrogen Chloride			2.091E-02	4.77E-01	5	9.54%
Silver			NA	3.06E-01	4.50E-01	68.05%
Acetaldehyde*			7.51E-05	1.31E-04	2.30E-04	57.02%
Arsenic			2.67E-02	4.67E-02	1.20E-01	38.90%
Benzene			1.65E-05	2.89E-05	3.00E-04	9.63%
Benzo(a)pyrene			2.61E-05	4.56E-05	5.60E-04	8.14%
Cadmium			2.86E-04	5.00E-04	6.70E-02	0.75%
Carbon Tetrachloride			1.78E-04	3.11E-04	4.30E-02	0.72%
Chloroform			2.23E-05	3.89E-05	8.30E-05	46.86%
Chromium, Hexavalent			1.85E-04	3.22E-04	3.80E-02	0.85%
1,2-Dichloroethane	NA		5.47E-02	7.70E-02	71.06%	
Formaldehyde*	2.10E-04		3.67E-04	4.20E-03	8.73%	
Nickel	1.87E-05		3.26E-05	3.00E-04	10.87%	
Polyaromatic Hydrocarbons						

\* Acrolein, Acetaldehyde and Formaldehyde modeled at actual emission rates for both the boiler and lumber drying kiln.

Other toxic air pollutants emitted by the boiler only and modeled at a 1 lb/hr emission rate.





**FIGURE 1**  
Location Map  
QB Corporation  
Salmon, Idaho





**APPENDIX A**  
**State Application Forms**  
**QB Corporation**